NATIONAL CANCER INSTITUTE
Technology Transfer Center

Virus-Like Particles That Can Deliver Proteins and RNA

Summary

The present invention describes novel virus-like particles (VLPs) that are capable of binding to and replicating within a target mammalian cell, including human cells. The claimed VLPs are safer than viral delivery because they are incapable of re-infecting target cells. The National Cancer Institute's Protein Expression Laboratory seeks parties interested in licensing the novel delivery of RNA to mammalian cells using virus-like particles.

NIH Reference Number

E-264-2011

Product Type

- Therapeutics

Keywords

- RNA delivery
- Virus-like particles
- protein expression
- antibody synthesis

Collaboration Opportunity

This invention is available for licensing.

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Description of Technology

The National Cancer Institute's Protein Expression Laboratory seeks parties interested in licensing the novel delivery of RNA to mammalian cells using virus-like particles.

Current methods of delivering proteins or RNA to mammalian cells are limited by a lack of target specificity and toxicity, among other shortcomings. NCI researchers have created novel virus-like particles (VLPs) that are capable of binding to and replicating within a target mammalian cell, including human cells. The claimed VLPs are safer than viral delivery because they are incapable of re-infecting target cells. The present VLPs can

optionally comprise inhibitory recombinant polynucleotides, such as microRNA, antisense RNA or small hairpin RNA, to down regulate or turn off expression of a particular gene within the target cell. Alternatively, recombinant polynucleotides packaged within VLPs can comprise a gene encoding a therapeutic protein so as to enable expression of that protein within the target cell. Specifically, VLPs of the invention are composed of an alphavirus replicon that contains a recombinant polynucleotide, a retroviral gag protein, and a fusogenic envelope glycoprotein.

While the claimed VLPs have a variety of applications, therapeutic uses of the VLPs include directing antibody synthesis and converting cancer cells into antigen presenting cells. Additional applications include using VLPs to induce fast (approx. 3-4 hrs) and high levels of protein production in mammalian cells.

Potential Commercial Applications

- Delivery of microRNA and small hairpin RNA to reduce expression of targeted genes in a human cell
- Delivery of coding RNA for robust expression in mammalian systems
- Direct antibody production by in vivo injection of replicons (no antigen purification)

Competitive Advantages

- Obviates the need to use expensive antigen purification for proteins or antigens produced inside target cells
- High level (~million copies per cell) of RNA production/synthesis within target cell
- Fast expression (approx. 3-4 hrs compared to 1-2 days) following VLP introduction into target cells

Inventor(s)

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Development Stage

- Pre-clinical (in vivo)

Patent Status

- **U.S. Patent Filed:** U.S. Patent Application Number PCT/US2013/31876, Filed 26 Sep 2014
- **Foreign Filed:** Foreign Filed - Patent Application

Related Technologies

- E-010-2008 - Method for Targeted Therapeutic Delivery of Proteins into Cells

Therapeutic Area

- Cancer/Neoplasm
- Infectious Diseases

Updated

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